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ABSTRACT

The effect of a tutorial and/or homework assistance program conducted by peers during the regular school day was investigated. Subjects were minority students from low socio-economic families. Student-tutors were assigned to provide 35 minutes of daily individualized assistance in mathematics, help that was not available in the home environment. Two groups of second-grade children who had failed to complete their homework assignments were selected. Four days per week the student-tutor helped five children in the experimental group with their homework assignments, and reviewed skills previously taught by the classroom teacher. Five children in the control group remained in their own classroom and studied independently. It was found that the children in the experimental group completed their homework every day, and they showed an overall growth in mathematics of 22 percent, whereas the children in the control group had an overall average growth of only nine percent after a 2-week period. Recommendations for student-tutoring programs are suggested. Appendices include an informal interview with the teacher; placement tests; module tests; individual pupil surveys regarding homework and attitudes; and a progress chart for growth. Lists 9 references. (YP)

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DAILY TUTORING AND/OR HOMEWORK ASSISTANCE IN MATHEMATICS BY PEERS DURING THE REGULAR SCHOOL DAY

by

Helen Ann Mendel

A Practicum Report
Submitted to the Faculty of the Center for the Advancement
of Education of Nova University in partial fulfillment
of the requirements for the degree of Educational Specialist.

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ABSTRACT

Daily Tutoring and/or Homework Assistance in Mathematics by Peers During the Regular School Day.
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Descriptors: Peer Groups/ Cross-Age Teaching/ Peer Influence/ Peer Groups/ Peer Counseling/ Homework Assignments/ Bilingual Students/ Spanish Speaking/ Non-English Speaking/ Ethnic Groups/ Minority Groups/ Minority Group Children/ Tutoring/ Teaching Methods/ Grade Two/ Primary Education/ Elementary Education/ Elementary Schools/ Student Improvement/ Student Development/ Academic Achievement/ Achievement Gains/ Mastery Learning Skills/ Motivation

The writer of this practicum observed that a high proportion of second grade Hispanic, Haitian, and/or Black American children from low socio-economic families failed to master the basic mathematics skills enumerated in the county-wide balanced curriculum guide because they did not have adequate motivation, help, and/or supervision at home to complete homework assignments designed to reinforce and extend mathematics skills introduced by the classroom teacher. By establishing a tutorial and/or homework assistance program conducted by peers during the regular school day, student-tutors were assigned to provide thirty-five minutes of daily individualized assistance in mathematics that was not available in the home environment.

Two groups of second grade children who, heretofore, had failed to complete their homework assignments, were selected. The ten children were pretested and divided into two groups. Four days per week the student-tutor helped the five children in the experimental group with their homework assignments, and she reviewed skills previously taught by the classroom teacher. The five children in the control group remained in their own classroom and studied independently. As a result, the children in the experimental group completed their homework every day, and they showed an overall growth in mathematics of twenty-two percent, whereas the five children in the control group had an overall average growth of only nine percent. (Appendices include: Informal Interview with Classroom Teacher; Placement Tests 1, 2, and 3; Book 2 Module Test 8.1; Individual Pupil Survey Regarding Homework; Individual Pupil Survey Reflecting Attitudes; Progress Chart For Growth in Mathematics.)

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Practicum Title: DAILY TUTORING AND/OR HOMEWORK ASSISTANCE IN MATHEMATICS BY PEERS DURING THE REGULAR SCHOOL DAY

Student's Name: Helen Ann Mendel

Program Site: Comstock Elementary School Date: June 8, 1983

Observer's Name: Nancy T. Mitchell
Nancy T. Mitchell

Observer's Position: Principal

I. PURPOSE

Ninety-eight percent of the students in one inner-city public school in South Florida were Hispanic, Haitian, and/or Black American children. These children came from a low socio-economic environment in which the single-parent family was very common. These children were frequently unable to get help with their homework assignments for a variety of reasons: their parents spoke and read little or no English, their parents were too busy working or taking care of other children, the parents were illiterate themselves, or they did not understand the American system of education and believed that all teaching and learning was accomplished during school hours.[1]

The teacher-pupil ratio in first, second, and third grade classes was approximately one to twenty-five. This primary school had two administrators and sixty teachers. The faculty had an average of eleven years of teaching experience. Forty-four of the teachers had Bachelor's Degrees, and sixteen of the teachers had Master's Degrees. The student population of one thousand children was divided into ten large areas, also known as pods, centrums, or arenas. Five teachers were assigned to each large area. Basically, however, one teacher was responsible for a specified group of twenty-five children. Large group instruction was utilized mostly for projects, films, science, social studies, plays, etc. The children received their instruction in mathematics by the same teacher every day.

The local school system mandated that teachers provide a

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[1]Appendix A: Informal Interview With Classroom Teacher

diagnostic/prescriptive mathematics program supplemented by homework assignments designed to reinforce and extend basic mathematics skills introduced by the classroom teacher. However, many children failed to complete homework assignments because of the above-mentioned reasons (over which the classroom teacher had little or no control), and consequently, many of the children did not master the mathematics skills enumerated in the county-wide balanced curriculum guide.

As a compensatory education teacher in this particular school, the writer believed that a program could be developed and implemented during the regular school day to provide additional assistance for children who were not provided adequate help and/or motivation at home to complete required assignments.

According to the county-wide balanced curriculum guide, children who were three-fourths through the second grade should have been able to master the following skills in mathematics (not all-inclusive):

(1) to write addition and subtraction equations for fact families related to sums to eighteen.

(2) to solve addition and subtraction equations for fact families related to sums to eighteen.

(3) to find sums and differences related to sums through eighteen.

(4) to master basic addition facts through eighteen.

(5) to add single-digit addends having a sum through eighteen.

(6) to solve word problems involving sums through eighteen.

(7) to recognize odd-even numbers less than twenty.

Thirteen children were randomly selected from a second grade class and tested on these skills. Mathematics In Our World Placement Tests 1, 2, and 3 and Mathematics In Our World Book 2 Module Test 8.1 were used for pretesting and posttesting.[2] A discrepancy clearly existed between what was and what should have been, i. e., only three of the thirteen children demonstrated mastery of these skills. This problem existed school-wide as evidenced by the fact that approximately one-tenth of the children were retained in the second grade because of low achievement in mathematics. Mathematics was one of the two basic skills in the primary grades. Also, children must pass all state assessment test items in mathematics at the beginning of third grade; if they were unable to master all items by the end of the third grade, they would automatically be retained.

The students in this inner-city public school were Hispanic, Haitian, and/or Black American children residing in a crowded, depressed neighborhood. Their parents spoke and read no English, a little English, or substandard English. Consequently, the children usually did not receive adequate motivation, help, and/or supervision at home to complete homework assignments designed to reinforce and extend mathematics skills introduced by the classroom teacher. These children also gave other reasons for not returning homework assignments, i. e., they left the worksheets on the bus bench or bus, their little siblings tore it, their parents had thrown it away, it had gotten wet in the rain, it had blown away, etc.[3]

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[2]Appendix B: Placement Tests 1, 2, and 3
Book 2 Module Test 8.1

[3]Appendix C: Individual Pupil Survey Regarding Homework

The classroom teacher of these second grade children had used the "reward system" for children who returned homework regularly and correctly completed. This system has had some degree of success. However, it was costly and often unfair for small children whose home environment was not conducive to studying.

Consequently, by providing thirty-five minutes of daily tutorial and/or homework assistance by peers during the regular school day, the five students in the experimental group completed their daily homework assignments and mastered the seven basic mathematics skills as enumerated in the county-wide balanced curriculum guide and identified above. The five students in the control group only occasionally completed their daily homework assignments and failed to master the seven basic mathematics skills as enumerated in the county-wide balanced curriculum guide. These skills were introduced or reviewed by the second grade classroom teacher during these ten weeks, and the homework was also assigned and graded by the classroom teacher. Mastery of these skills was a county-wide expectancy by the end of second grade.

In order to determine if the daily tutorial assistance had made a difference, the five children in the experimental group, the five children in the control group, and the student-tutor were posttested after ten weeks with the same test administered before the implementation of the practicum. The test scores were compared, growth within the experimental and control groups was analyzed, and a conclusion drawn, from the posttesting, that the tutorial program utilizing a student-tutor had made a difference in the students' achievement in mathematics.

To bolster the tangible and measureable growth in mathematics, the children demonstrated a more positive attitude towards school as evidenced by teacher observation, and the children developed a more mature sense of responsibility towards completing homework assignments.

II. RESEARCH

Literature presented a variety of methods which could be implemented to help children reinforce their mathematics skills and complete their homework assignments. Cross-age tutorial programs provided positive learning experiences.[4] However, in writer's primary school, this kind of program was almost impossible to implement because only two levels of children, namely second and third graders, remained in school from 1:45 until 2:45 when the tutorial program could be implemented without conflicting with teacher-directed instruction.

Keeping children in school after regular school hours as a method of punishing them for not completing homework was often not feasible or productive for many reasons. First, small children in the inner-city usually took a bus home; causing them to miss their bus endangered their safety and posed a serious liability upon the child, the teacher, and the school. Secondly, safety of small children who walk home with other children in their heighborhood would be jeopardized if they were detained after school and they had to walk home alone. Thirdly, county-wide school board policy mandated that parents be notified in writing twenty-four hours in advance if their child were going to be kept after regular school hours. Fourthly, the classroom teacher's planning time was consumed when she helped individual children after regular school hours. Lastly, keeping children after school tended to foster negative self-concepts which may be counter-productive.[5]

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[4]Frederic Medway and Charles A. Lowe, "Causal Attribution For Performance By Cross-Age Tutors and Tutees," American Educational Research Journal, XVII (September, 1980), 377-87.

[5]Margaret M. Phillips and Marjorie Carr Smith, Try These Answers (New York: Row, Peterson and Company, 1956), 44-45.

The "Grandparent Program" was a viable solution to providing individual homework assistance in mathematics. With this federally-funded program, an elderly person on welfare was paid, by the hour, to help individuals and small groups of children during the regular school day. However, in the writer's school, this program was presently not available.

Mathematics skills were reinforced after regular school hours in the federally-funded Chapter I Extended School Day Program. This program provided instruction and reinforcement of mathematics skills for one hour after school four days per week. The children were also provided free transportation home. However, in order to qualify for this program, a child had to fall between the eleventh and twenty-fifth percentiles on the group-administered Stanford Achievement Test. Unfortunately, many children needing help in mathematics scored either below or above the stipulated percentiles, and therefore, could not be admitted into the program.

In theory, children can help other children in many ways.[6] In fact, federally-funded studies have shown that both student-tutors and their pupils made significant gains in achievement, especially when pupils were tutored by trained student-tutors.

Daily tutoring and/or homework assistance by peers during the regular school day had many positive factors. It was cost-free because only readily available workbooks, games, and mathematics textbooks were used. The children did not miss any direct teacher instruction because no new skills or concepts

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[6]Eva E. Conrad, The Effects of Tutor Achievement Level, Reinforcement Training, and Expectancy on Peer Tutoring (Washington, D.C.: Office of Education, 1975).

were introduced during the last thirty-five minutes of each day. The student-tutors considered it a privilege to be selected for the program, and the pupils appreciated the individual attention and help in getting their mathematics assignments completed.

Student-tutors were effective teachers because of many factors: (1) The student-tutors saw difficulties in learning from a child's point of view; (2) Student-tutors did not seem to become impatient with their peers; (3) The classroom teacher and the pupils were thankful that individual help was being provided for children who, heretofore, had been unable to get special assistance; (4) Children appeared to relate well to other children who could help them.

The effectiveness of having children help or teach other children was soundly based in research. The peer-tutoring process served as a motivating force which yielded positive academic and attitudinal progress in students.[7] Even when the student-tutors, as well as the pupils, were originally unmotivated, after several months of tutoring sessions, both the student-tutors and their pupils showed an improvement in attitude towards school and behavior in school.[8] When only tutored skills or items were considered, achievement of tutored students increased much more than the achievement of comparison groups not

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[7]Joan L. Fogarty and Margaret C. Wang, "An Investigation of The Cross-Age Peer Tutoring Process: Some Implications For Instructional Design and Motivation," Elementary School Journal, LXXXII, No. 5 (May, 1982), 451-469.

[8]Madan Mohan, "Peer Tutoring as a Technique For Teaching The Unmotivated," Child Study Journal, I (Summer, 1971), 217-225.

tutored.[9] When the student-tutoring was ended, the children continued to earn significantly higher grades in mathematics than those children who had not received student-tutoring assistance.[10] Robert Strom, in the Elementary School Journal[11], advocated the technique of playing academic-oriented games as a successful method for teaching and reinforcing mathematics skills in peer-teaching situations. The conclusion may be drawn that students made excellent tutors, and both groups of children (student-tutors and pupils) benefitted academically and socially.

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[9]Nancy Zajano and W. Donald Hubbard, Guiding Older Children as Tutors: A Report On The Field Test (Washington,D. C.: National Institute of Education, 1975).

[10]Leonard Jason and Susan Frasure, Increasing Peer-Tutoring Behavior in a Third Grade Classroom (New York: Prentice-Hall, Inc., 1963).

[11]Robert D. Strom, "Play and Peer Teaching," Elementary School Journal, LXXIV, No. 2 (November, 1978), 74-80.

III. METHOD

Thirteen Hispanic, Haitian, and/or Black American children were randomly selected from a second grade class and tested on the following skills:

(1) to write addition and subtraction equations for fact families related to sums to eighteen.

(2) to solve addition and subtraction equations for fact families related to sums to eighteen.

(3) to find sums and differences related to sums through eighteen.

(4) to master basic addition facts through eighteen.

(5) to add single-digit addends having a sum through eighteen.

(6) to solve word problems involving sums through eighteen.

(7) to recognize odd-even numbers less than twenty.

Mathematics In Our World Placement Tests 1, 2, and 3 and Mathematics In Our World Book 2 Module Test 8.1[12] were used for pretesting and posttesting. These tests were group administered and individually scored. The Placememt Tests had a total of ninety items and the Module Test had a total of twenty-two items. Placement Test 1 contained eighteen items covering the skills presented at the beginning of the school year, namely counting to one hundred using a visual stimulus, writing missing numerals one to one hundred, and determining greater than and less than when counting to one hundred. Placement Test 2 contained thirty-six items. These items required the pupils to find the sums and differences related to sums through eighteen. Placement Test 3

[12]Appendix B: Placement Tests 1, 2, and 3
Book 2 Module Test 8.1

also contained thirty-six items that required the pupils to find the sums and differences related to sums through eighteen. Module Test 8.1 contained twenty-two items. Eight items required the pupils to solve addition equations for fact families related to sums to eighteen. Twelve items required the pupils to find sums of numerals through eighteen. One item required the pupils to solve a word problem involving sums through eighteen. One item required the pupils to recognize even numbers less than twenty.

The pretesting took approximately three days, thirty-five minutes per day, and the posttesting took about three days, thirty-five minutes per day. Seventy-five percent accuracy was considered mastery. Of the thirteen children pretested, only three demonstrated mastery of all the skills on the pretest. These three children were not included in the experimental or control groups. The pretests were administered in February, and the posttesting took place in May. The tests were paper-and-pencil tests available from the Addison-Wesley Company. The student-tutor was also administered these tests to verify her mastery of the designated mathematics skills prior to her helping the other pupils. The student-tutor was selected for several reasons. She was in the third grade and had complete mastery of the second grade skills. She had good rapport with the other children as evidenced by the fact that she liked to help other pupils and other pupils liked her to help them. This fact was noticed by the classroom teacher and the reading teacher. Also, her physical education time could be changed so that she did

not miss any teacher-directed lessons while tutoring the second grade pupils near the end of each day.

Five children, from the ten pretested second grade children who failed to demonstrate mastery on the pretest, were randomly selected to be the experimental group, and the other five children were the control group. The student-tutor was also pretested and posttested with the Addison-Wesley Mathematics In Our Land Grade 2 Placement Test 1, 2, and 3 to assess growth in mathematics. All children were administered an informal survey to assess the development of their attitudes towards school, homework,[13] and responsibilities.[14]

Four days per week the student-tutor picked up the five children in the experimental group at 1:45, brought them to the writer's classroom, reviewed skills previously taught by the classroom teacher, helped the children with their homework assigned by the classroom teacher, and rewarded the children with praise and candy for correctly completed homework and good behavior. After thirty-five minutes, the student-tutor returned the pupils to their classroom, and then returned to her own classroom. During this time the five children in the control group remained in their classroom and did a variety of activities: they completed class assignments, they looked at filmstrips, they studied independently, they began homework assignments unaided, etc.

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[13] Appendix C: Individual Pupil Survey Regarding Homework

[14] Appendix D: Individual Pupil Survey Reflecting Attitudes

The daily tutoring and/or homework assistance program in mathematics by peers during the regular school day could only be conducted four days per week because all the children left school at 1:45 on Wednesday, the earliest time the writer was free to supervise the program.

The writer's role was many-faceted. Foremost, the writer provided adult supervision for the student-tutor and pupils as required by county-wide school board policy. The writer obtained all materials and supplies for the student-tutor and the pupils. These materials and supplies included Addison-Wesley Mathematics In Our World Grade 2 workbooks identical to those used by the classroom teacher. A separate set of workbooks had to be obtained for this program so that the student-tutor could use activities from earlier lessons in the book as review of skills the children had learned earlier in the year. Other supplies included addition and subtraction flash cards for facts through eighteen which were borrowed from the second grade classroom teacher. Paper, pencils, and chalk were obtained from the assistant principal and readily available in the writer's classroom.

The writer also demonstrated a few teaching techniques to the student-tutor. For example, in addition, the student-tutor could "put" the larger number in her head with the left hand and count on her right hand until she got to the number of the smaller addend. When the student-tutor got to the number of the smaller addend on her right hand, the number she said aloud was the total. In subtraction, the "hit-man" game was demonstrated. The student-tutor "hit" the smaller number with her right hand, and continued

counting on her fingers until she got to the larger number. When she counted to the larger number, the fingers on her right hand showed the difference in the subtraction problem. These two games used to teach addition and subtraction were just some of the games that the writer demonstrated to the student-tutor to help her in teaching the basic facts in mathematics.

The writer asked for permission and cooperation from the Principal, Assistant Principal, second grade teacher, and third grade teacher to conduct the daily tutoring and/or homework assistance program. The physical education teacher was asked to change the physical education time for the student-tutor. The media specialist was asked for additional flash cards and film strips in mathematics. Adequate and official clearance and approval was obtained verbally from these school personnel. The writer also obtained, from the classroom teacher, a list of specific skills, worksheets, and assignments to be completed by the pupils per week.

The student-tutor kept a sample of graded supplementary written mathematics exercises on file in the writer's classroom, and the pupils gave their completed daily homework assignments to their classroom teacher at the end of each daily tutoring session. The student-tutor also kept a daily log of pupils' progress and behavior.

As a motivational technique, the writer purchased and gave the student-tutor candy to give the pupils who completed their work and/or behaved well for her. The student-tutor also took extra candy for herself. Since the student-tutor, as well as the

pupils, were from a low socio-economic neighborhood and received the federally-subsidized free lunch, the writer gave second-hand clothes to the student-tutor to show appreciation for her hard work and dedication.

During the daily tutoring sessions, the only people in the classroom were the student-tutor, the five pupils in the experimental group, and the writer. The writer remained at her desk and graded papers - an unauthoritative role. The student-tutor usually permitted the pupils to get a drink of water at the beginning of each session.

At the beginning of this program, the second grade classroom teacher did not permit any of the five pupils to come to the tutoring sessions if a pupil had not completed all his work in the regular classroom. Since coming to the tutoring sessions was perceived as a privilege by the pupils, withdrawing this activity once or twice soon motivated the pupils to complete the work in their regular classroom so they could go to the student-tutor.

Occasionally the classroom teacher asked if another pupil, not in the experimental or control groups, could take the place of a pupil who was absent. Since the tutoring program was part of a study for the university, this courtesy could not be granted at the present time.

The writer, in cooperation with the second grade classroom teacher and the student-tutor, assisted in monitoring and evaluating progress and making any mid-course corrections, if necessary. Specifically, the writer examined the completed

homework assignments for completeness, accuracy, and neatness. The writer suggested to the student-tutor that she reward children for one desired outcome per day, provided she had told the pupils the day before the skill she would be looking for tomorrow. For example, the student-tutor told the pupils that she had an extra candy for any pupil who completed his work quietly tomorrow or for any pupil who completed his work without erasing tomorrow.

Progress in mathematics was evaluated by student-tutor observation and the writer's observation. The mathematics program did not include any paper-and-pencil test to assess mastery halfway through a module. Therefore, facility with, and accuracy of, workbook assignments provided the best indication of progress within the mathematics program.

No mid-course corrections appeared to be necessary. The student-tutor seemed proud and willing to help the second grade children, and the pupils liked the daily privilege and routine. A substitute student-tutor would have been welcomed by the pupils on the few days that the student-tutor was absent. However, because of the necessity for training the student-tutor, getting the student-tutor released from her own homeroom class, and changing her time for physical education, the writer felt that the student-tutoring program had to be cancelled when the student-tutor was absent. The pupils seemed to understand this arrangement, and no friction was caused, even though the pupils appeared genuinely disappointed when the student-tutor was absent. Incidentally, the student-tutor was absent only three times in ten weeks, possibly because of the responsibility given to her.

The student-tutor also used some mathematical games and activities that she had seen other teachers use in teaching mathematics. One game that drilled the addition and subtraction facts was called "bus stop." The student-tutor selected a child who was sitting up straight to be the "bus driver." The "bus driver" stopped or stood behind one child. The student-tutor then held up flash cards with addition or subtraction facts and the child who called out the correct answer first was the winner. The winner remained standing and going from "passenger" to "passenger" until a "passenger" called out the correct answer first. When this occured, the loser sat down, the winner stood up behind another "passenger," and the game continued. The student-tutor frequently played this game with the pupils for the first fifteen minutes of the class. This activity readily held the pupils' attention, while at the same time, it reinforced computation skills and helped to develop speed in the basic skills.

Because of the county-wide policy that mathematics activities had to be on or near grade level before a letter grade of "A," "B", or "C" could be given, the student-tutor was advised to give perfectly completed worksheets a "star," worksheets completed with only a couple of errors received a "happy face," and worksheets completed poorly received a "sad face." The student-tutor always explained the errors to the pupils so that they learned from their mistakes.

The organization of the student-tutoring program and its effectiveness in assisting pupils with their homework and consequently with their overall mathematics achievement and sense of

responsibility toward school assignments was explained to other faculty members for possible future use in other content areas. Obviously, one student-tutor could only work with one group of pupils per day so that the tutoring does not interfere with the student-tutor's regular academic program.

IV. RESULTS

After a period of ten weeks, the writer administered a post-test, identical to the pretest, to the ten pupils who had not demonstrated mastery on the pretest, and to the student-tutor. Five of the children posttested were in the experimental group, and five of the children posttested were in the control group. The three children who demonstrated mastery on the pretest were neither tutored nor posttested. The posttesting took place in the same room as the pretesting and tutoring and required about three afternoons, thirty-five minutes per day. The posttest was a paper-and-pencil test, the Addison Wesley Mathematics In Our World Grade 2 Placement Tests 1, 2, and 3 and Mathematics In Our World Grade 2 Module Test 8.1.[15]

The Progress Chart For Growth In Mathematics[16] clearly showed the results. The top line reflected the pretest raw score, the middle line reflected the posttest raw score, and the bottom line reflected percentage of growth. When a child's score was lower on the posttest than on the pretest, the growth was shown as a negative (-).

The student-tutoring program in mathematics was unequivocally successful as reflected by the average percentage of growth, and it was also practically cost-free. According to the raw scores shown on the Progress Chart, the five children in the experimental group had an overall average growth of twenty-two percent, whereas the control group had an overall average growth of only

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[15]Appendix B: Placement Tests 1, 2, and 3
Book 2 Module Test 8.1

[16]Appendix E: Progress Chart For Growth In Mathematics

nine percent. This growth illustrated that homework assignments maintained and reinforced skills in mathematics, and that a student-tutor provided meaningful assistance with homework.

Specifically, the first mathematics skill measured was to write addition and subtraction equations for fact families related to sums to eighteen. The growth for the experimental group averaged forty percent, and the growth for the control group averaged zero percent.

The second mathematics skill measured was to solve addition and subtraction equations for fact families related to sums to eighteen. The growth for the experimental group averaged twenty-two percent, and the growth for the control group averaged thirteen percent.

The third mathematics skill measured was to find sums and differences related to sums through eighteen. The growth for the experimental group averaged nine percent, and the growth for the control group averaged three percent.

The fourth mathematics skill measured was to master basic addition facts through eighteen. The growth for the experimental group averaged twelve percent, and the growth for the control group averaged five percent.

The fifth mathematics skill measured was to add single-digit addends having a sum through eighteen. The growth for the experimental group averaged eleven percent, and the growth for the control group averaged one percent.

The sixth mathematics skill measured was to solve word problems involving sums through eighteen. The growth for the

experimental group averaged twenty percent, and the growth for the control group averaged zero percent.

The seventh mathematics skill measured was to recognize odd-even numbers less than twenty. The growth for the experimental group averaged forty percent, and the growth for the control group averaged forty percent.

The student-tutor, who had shown mastery of all the skills on the pretest, showed an overall growth averaging two percent for all seven areas combined.

Since mathematics was one of the two basic skills in elementary school, reading being the other basic skill, the increased percentage of growth shown by the experimental group, above the control group, was indeed significant.

An informal survey administered orally to each child individually prior to, and following, the ten weeks of student-tutoring reflected several positive behavior changes and side effects in the experimental group but not in the control group. As far as homework was concerned,[17] one hundred percent of the experimental group and twenty percent of the control group reflected an improvement rate of completing and handing in homework. Even though the children were only in the second grade, all the children in the experimental group stated that there was nobody at home to help them with their homework but that the student-tutor had helped them in school; consequently, they did not really need help at home. As far as attitudes were

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[17]Appendix C: Individual Pupil Survey Regarding Homework

concerned,[18] eighty percent of the experimental group and twenty percent of the control group reflected a more positive attitude towards school and homework. It may be concluded from these results that the student-tutoring program resulted in the pupils' higher rate of completing and returning homework and a more positive attitude toward school and homework.

Because of the nature of the questions on the informal oral interview with the second grade classroom teacher,[19] only one area reflected an improvement after the student-tutoring program was initiated, namely "Do most of the children in your low mathematics group return the homework correctly completed?" The second grade teacher also noted that since the five children in the experimental group had improved their mathematics skills and had developed the habit of completing assignments, they appeared to be better adjusted in class and they tried harder in their other subjects as well. The classroom teacher had not noticed these improvements in the control group.

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[18]Appendix D: Individual Pupil Survey Reflecting Attitudes

[19]Appendix A: Informal Interview With Classroom Teacher

V. RECOMMENDATIONS

The student-tutoring program will be a very effective instructional tool to use at the beginning of the school year to review and reinforce mathematics skills that the pupils had learned the previous year. By utilizing the student-tutoring program, which is practically cost-free, many pupils will develop the habit of completing homework assignments promptly and correctly while, simulaneously, strengthening their mathematics skills. The student-tutor seems to be able to drill mathematics computation skills very easily, but seems to have more difficulty with concepts and application in mathematics.

If the student-tutoring program were to commence at the beginning of second grade, the following skills would be appropriate for review and reinforcement, providing the children are on grade level:

(1) to identify the number of a set that has from zero through nine objects and to write the corresponding numeral

(2) to count and order the numbers zero through ninety-nine

(3) to solve addition problems having sums through ten

(4) to solve subtraction problems having differences related to sums through ten

(5) to find the missing addend in an addition equation having a sum of ten or less

If the children were below grade level in mathematics, skills would be selected that correspond to those the children had

learned during the previous grading period, regardless of the academic grade level these may be.

The student-tutoring program could be implemented with pupils of any grade level in elementary school. Actually, the student-tutor and pupils could be in the same grade or even in the same class. However, if a teacher were not available to supervise the student-tutor and pupils in a designated room, the classroom teacher may have to limit the number of pupils per student-tutor to only three or four children so that the pupils would not disburb their classmates.

Since the student-tutoring program was so successful in improving the mathematics skills of the second grade children, a brief staff development program to acquaint faculty members with the concept and to expand its application to other content areas would appear beneficial to pupils and teachers alike. The staff-development facilitator would probably want to explain the program, enumerate its positive results, and point out the areas of the curriculum for which student-tutoring appears to be most amenable.

The student-tutoring program seems to be most effective for drill, review and reinforcement of specific information. For example, skills such as mathematics computation, spelling, and sight vocabulary are skills for which the pupils are usually assigned homework on a regular basis, and for which student-tutors can help their peers without detailed input provided beforehand.

Other faculty members interested in implementing the

student-tutoring program should be made aware of the fact that better results are obtained when the student-tutor is provided more training or given the opportunity to observe other adults, either aides or teachers, working with small groups of children. The teacher responsible for the student-tutor and pupils would find it advantageous to inform the student-tutor of a few basic rules, such as the following: use positive motivation, provide all necessary working materials, never use corporal punishment, whisper so you do not disturb others, and copy what you see other teachers doing that you like. The pupils selected to receive help with their homework should also be informed of a few basic facts. First, receiving daily tutoring and/or homework assistance by student-tutors during the regular school day is indeed a privilege. Second, obeying and respecting the student-tutor is necessary for their own benefit. Third, any pupil who does not obey the rules will lose the privilege of going to the student-tutor and will have to do his homework without any special help in school. Fourth, the pupils can be told that these rules are for their own benefit, so that they will all be "smart" by the end of the nine weeks, or whatever time period the teacher has established.

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APPENDIX A

INFORMAL INTERVIEW WITH CLASSROOM TEACHER

You assign daily mathematics homework.	yes	before practicum
	yes	after practicum
	-0-	growth
Most of the children in your low mathematics group return their homework correctly completed.	no	before practicum
	yes	after practicum
	50%	growth
You are successful in contacting the parents of children who do not study and complete their mathematics homework regularly.	no	before practicum
	no	after practicum
	-0-	growth
Subsequent to an occasional parent conference, the children complete their homework assignments more regularly.	no	before practicum
	no	after practicum
	-0-	growth

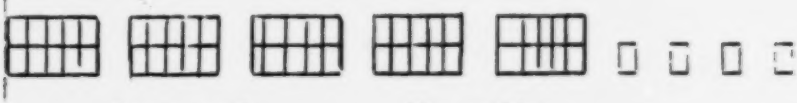
APPENDIX B

PLACEMENT TEST 1

How many?

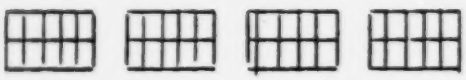
_____ tens and _____. We write _____.

How many?



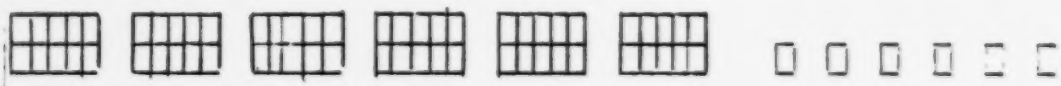
_____ tens and _____. We write _____.

How many?



_____ tens and _____. _____

How many?



_____ tens and _____. _____

Put > or < in each ◯.

29 ◯ 22 74 ◯ 79 53 ◯ 44

Write the missing numerals.

Robert E. Eicholz and Phares G. O'Daffer and Charles Fleenor, Mathematics in Our World Book Two Duplicating Masters (Menlo Park, California: Addison-Wesley Publishing Company, Inc., 1978.

APPENDIX B

PLACEMENT TEST 2

Add.

$\begin{array}{r} 2 \\ +\,5 \end{array}$	$\begin{array}{r} 4 \\ +\,6 \end{array}$	$\begin{array}{r} 4 \\ +\,5 \end{array}$	$\begin{array}{r} 2 \\ +\,4 \end{array}$	$\begin{array}{r} 3 \\ +\,7 \end{array}$	$\begin{array}{r} 4 \\ +\,4 \end{array}$
$\begin{array}{r} 2 \\ +\,8 \end{array}$	$\begin{array}{r} 3 \\ +\,4 \end{array}$	$\begin{array}{r} 3 \\ +\,6 \end{array}$	$\begin{array}{r} 3 \\ +\,2 \end{array}$	$\begin{array}{r} 2 \\ +\,6 \end{array}$	$\begin{array}{r} 6 \\ +\,4 \end{array}$
$\begin{array}{r} 3 \\ +\,5 \end{array}$	$\begin{array}{r} 7 \\ +\,3 \end{array}$	$\begin{array}{r} 0 \\ +\,0 \end{array}$	$\begin{array}{r} 5 \\ +\,4 \end{array}$	$\begin{array}{r} 5 \\ +\,3 \end{array}$	$\begin{array}{r} 2 \\ +\,7 \end{array}$

Subtract.

$\begin{array}{r} 10 \\ -\,5 \end{array}$	$\begin{array}{r} 9 \\ -\,6 \end{array}$	$\begin{array}{r} 10 \\ -\,3 \end{array}$	$\begin{array}{r} 9 \\ -\,2 \end{array}$	$\begin{array}{r} 8 \\ -\,5 \end{array}$	$\begin{array}{r} 10 \\ -\,4 \end{array}$
$\begin{array}{r} 4 \\ -\,4 \end{array}$	$\begin{array}{r} 10 \\ -\,7 \end{array}$	$\begin{array}{r} 7 \\ -\,4 \end{array}$	$\begin{array}{r} 9 \\ -\,4 \end{array}$	$\begin{array}{r} 8 \\ -\,3 \end{array}$	$\begin{array}{r} 7 \\ -\,5 \end{array}$
$\begin{array}{r} 9 \\ -\,3 \end{array}$	$\begin{array}{r} 10 \\ -\,6 \end{array}$	$\begin{array}{r} 9 \\ -\,7 \end{array}$	$\begin{array}{r} 9 \\ -\,5 \end{array}$	$\begin{array}{r} 8 \\ -\,6 \end{array}$	$\begin{array}{r} 10 \\ -\,8 \end{array}$

Robert E. Eicholz and Phares G. O'Daffer and Charles Fleenor, Mathematics in Our World Book Two Duplicating Masters (Menlo Park, California: Addison-Wesley Publishing Company, Inc., 1978).

APPENDIX B

PLACEMENT TEST 3

Add.

$\begin{array}{r} 8 \\ +\ 9 \end{array}$	$\begin{array}{r} 6 \\ +\ 8 \end{array}$	$\begin{array}{r} 4 \\ +\ 9 \end{array}$	$\begin{array}{r} 7 \\ +\ 7 \end{array}$	$\begin{array}{r} 8 \\ +\ 7 \end{array}$	$\begin{array}{r} 6 \\ +\ 7 \end{array}$
$\begin{array}{r} 7 \\ +\ 6 \end{array}$	$\begin{array}{r} 5 \\ +\ 9 \end{array}$	$\begin{array}{r} 5 \\ +\ 8 \end{array}$	$\begin{array}{r} 8 \\ +\ 8 \end{array}$	$\begin{array}{r} 5 \\ +\ 7 \end{array}$	$\begin{array}{r} 6 \\ +\ 9 \end{array}$
$\begin{array}{r} 7 \\ +\ 8 \end{array}$	$\begin{array}{r} 5 \\ +\ 6 \end{array}$	$\begin{array}{r} 9 \\ +\ 7 \end{array}$	$\begin{array}{r} 4 \\ +\ 8 \end{array}$	$\begin{array}{r} 9 \\ +\ 9 \end{array}$	$\begin{array}{r} 7 \\ +\ 9 \end{array}$

Subtract.

$\begin{array}{r} 11 \\ -\ 6 \end{array}$	$\begin{array}{r} 14 \\ -\ 8 \end{array}$	$\begin{array}{r} 13 \\ -\ 8 \end{array}$	$\begin{array}{r} 16 \\ -\ 7 \end{array}$	$\begin{array}{r} 18 \\ -\ 9 \end{array}$	$\begin{array}{r} 11 \\ -\ 7 \end{array}$
$\begin{array}{r} 13 \\ -\ 4 \end{array}$	$\begin{array}{r} 11 \\ -\ 8 \end{array}$	$\begin{array}{r} 17 \\ -\ 9 \end{array}$	$\begin{array}{r} 13 \\ -\ 7 \end{array}$	$\begin{array}{r} 15 \\ -\ 9 \end{array}$	$\begin{array}{r} 16 \\ -\ 9 \end{array}$
$\begin{array}{r} 17 \\ -\ 8 \end{array}$	$\begin{array}{r} 13 \\ -\ 9 \end{array}$	$\begin{array}{r} 12 \\ -\ 7 \end{array}$	$\begin{array}{r} 15 \\ -\ 8 \end{array}$	$\begin{array}{r} 16 \\ -\ 8 \end{array}$	$\begin{array}{r} 14 \\ -\ 9 \end{array}$

Robert E. Eicholz and Phares G. O'Daffer and Charles Fleenor, Mathematics in Our World Book Two Duplicating Masters (Menlo Park, California: Addison-Wesley Publishing Company, Inc., 1978).

APPENDIX B

MODULE TEST 8.1

Add.

$6 + 8 = \square$ $\quad$ $7 + 7 = \square$

$4 + 7 = \square$ $\quad$ $9 + 6 = \square$

$7 + 9 = \square$ $\quad$ $3 + 8 = \square$

$9 + 2 = \square$ $\quad$ $8 + 7 = \square$

5 +6	3 +9	5 +9	7 +5
6 +9	5 +8	9 +9	8 +9
4 3 +7	2 6 +5	5 3 +6	8 1 +7

Tim caught 7 fish.
Nina caught 6 fish.
How many fish in all?

_____

Put a ring around the even numbers.

11 12 13 14

Robert E. Eicholz and Phares G. O'Daffer and Charles Fleenor, Mathematics in Our World Book Two Duplicating Masters (Menlo Park, California: Addison-Wesley Publishing Company, Inc., 1978).

APPENDIX C

INDIVIDUAL PUPIL SURVEY REGARDING HOMEWORK

	Experimental Affirmative Response	Control Affirmative Response	
I complete my homework in mathematics every day.	0	0	before practicum
	5	1	after practicum
	100%	20%	growth
I hand in my homework in mathematics every day.	0	0	before practicum
	5	1	after practicum
	100%	20%	growth
Somebody is home who can help me with my homework.	0	1	before practicum
	0	1	after practicum
	0%	0%	growth
I have a good reason for not completing and returning my homework every day.	5	4	before practicum
	0	4	after practicum
	100%	0%	growth

APPENDIX D

INFORMAL PUPIL SURVEY REGARDING ATTITUDES

	Experimental Pupils: Affirmative Response	Control Pupils: Affirmative Response	
Do you like school?	1	2	before practicum
	5	3	after practicum
	80%	20%	growth
Do you like to do homework?	1	1	before practicum
	5	2	after practicum
	80%	20%	growth

APPENDIX E

PROGRESS CHART FOR GROWTH IN MATHEMATICS

SKILL	Experimental Pupils					Control Pupils					Tutor
	1	2	3	4	5	6	7	8	9	10	11
To write addition and subtraction equations for fact families related to sums to eighteen. (1 item)	0	0	1	0	1	1	0	1	0	0	1
	1	1	1	0	1	1	0	0	0	1	1
	100%	100%	0	0	0	0	0	-100%	0	100%	0
	Average Growth 40%					Average Growth 0%					0%
To solve addition and subtraction equations for fact families related to sums to eighteen. (8 items)	5	7	6	5	4	5	2	3	0	6	8
	7	7	8	6	8	5	4	4	2	6	8
	25%	0	12.5%	20%	20%	0	25%	12.5%	25%	0	0
	Average Growth 22%					Average Growth 13%					0%
To find sums and differences related to sums through eighteen. (84 items)	50	70	60	72	48	76	60	74	50	70	80
	70	82	62	74	50	78	62	76	51	75	82
	24.3%	15.4%	2.4%	2.3%	2.4%	2.4%	2.4%	2.4%	1.2%	5.9%	2.4%
	Average Growth 9%					Average Growth 3%					2.4%
To master basic addition facts through eighteen. (56 items)	36	40	31	36	29	34	34	29	28	42	52
	40	48	38	42	37	36	35	29	30	50	56
	7.2%	14.3%	12.5%	10.8%	14.3%	3.5%	1.8%	0	3.5%	14.2%	7.2%
	Average Growth 12%					Average Growth 5%					7.2%

First Line = Pretest raw score
Second Line = Posttest raw score
Third Line = Pupil growth in percent
Fourth Line = Average group growth in percent

APPENDIX E

PROGRESS CHART FOR GROWTH IN MATHEMATICS

SKILL	Experimental Pupils					Control Pupils					Tutor
	1	2	3	4	5	6	7	8	9	10	11
To add single digit addends having a sum through eighteen. (56 items)	48	50	44	46	40	48	46	50	40	48	54
	53	55	50	52	48	46	46	52	44	48	56
	8.9%	9.0%	10.7%	10.7%	14.3%	3.6%	0	3.6%	7.1%	0	3.6%
	Average Growth 11%					Average Growth 1%					3.6%
To solve word problems involving sums through eighteen. (1 item)	0	1	0	1	0	0	1	0	0	1	1
	1	1	0	1	0	1	0	0	0	1	1
	100%	0	0	0	0	100%	100%	0	0	0	0
	Average Growth 20%					Average Growth 0%					0%
To recognize odd-even numbers less than twenty. (1 item)	0	1	1	0	1	1	0	0	0	0	1
	1	1	1	1	1	1	1	0	0	1	1
	100%	0	0	100%	0	0	100%	0	0	100%	0
	Average Growth 40%					Average Growth 40%					0%

First Line = Pretest raw score
Second Line = Posttest raw score
Third Line = Pupil growth in percent
Fourth Line = Average group growth in percent